OPEN LETTERS.

SPECIES OF BOTRYCHIUM.

To the Editors of the Botanical Gazette:—In the second edition of *Gray's Manual of Botany* (1856), and continued in the third and fourth editions, under the species *Botrychium Virginicum* occurs this remarkable statement:

"Var.? *simplex* (*B. simplex*, Hitch.) appears to be a remarkably depauperate state of this, only 2'–5' high, the sterile frond reduced to a single short-stalked division, and simply or doubly pinnatifid," etc.

I cite the above to show that the practice of reduction of distinct species of Botrychium is one that has long been followed beyond the river Charles.

There are to my knowledge three general accounts of the genus Botrychium that have appeared within the past thirty years, and as they differ somewhat widely I reproduce the disposition of species in each case. In the last column a double star indicates the species accredited to our territory.

Milde, 1868, 1869, 1870[1]	Baker, 1874; reiterated, 1891[2]	Prantl, 1884[3]
1. B. Lunaria Sw.	1. B. simplex Hitch.	1. B. Lunaria Sw.**
2. B. crassinervium Rupr.		
3. B. boreale Milde.	2. B. rutaceum Sw.	2. B. boreale Milde**
4. B. matricariaefolium A. Br.		3. B. lanceolatum Angs**
5. B. lanceolatum Angs.		4. B. matricariaefolium A. Br.**
6. B. simplex Hitch.	3. B. Lunaria Sw.	5. B. simplex Hitch.**
7. B. ternatum Sw.	4. B. ternatum Sw.	6. B. ternatum Sw.
		7. B. daucifolium Wall.
		8. B. subbifoliatum Brack.
		9. B. australe R. Br.
8. B. daucifolium Wall.	5. B. daucifolium Wall.	10. B. silaifolium Presl**
		11. B. obliquum Willd**
		12. B. lunarioides Sw **
		13 B. rutifolium A. Br.
9. B. lanuginosum Wall.	6. B. Virginianum Sw.	14. B. lanuginosum Wall.
10. B. Virginianum Sw.		15. B. Virginianum Sw.**

The first record of the *ternatum* group from America appears to have been that of Lamarck's species 1797 (*Osmunda biternata*), which was re-described by Michaux in 1803 (*Botrypus lunarioides*) under another name. In Pursh's Flora (1814) there was introduced a confusion which continued until the modification of Milde's arrangement which appeared in the sixth edition of *Gray's Manual of Botany*. That Milde fell into Pursh's error of confusing various Atlantic forms under Michaux's name is perfectly evident from his text:—(1) Milde's description of *lunarioides* is generalized and

[1] Verhandl. k. k. zool. bot. Ges. Wien **18**: 507–516; **19**: 55–190; **20**: 999–1002.

[2] Synopsis Filicum 447, 448. 1874; Ann. Bot. **5**: 500. 1891.

[3] Jahrb. des kön. bot. Gartens, Berlin **3**: 297–350. 1884.

indefinite, and while it may well cover a great variety of forms it does not at all delimit the very distinct *Botrychium biternatum* (Lam.); (2) from his quotation, or rather translation, of the range given by Pursh: "Auf Triften und in lichten Wäldern von New York bis Carolina (Pursch);" (3) from his later citation of additional localities for the plant from Lake Superior (Macoun) and Montreal (Watt) which, as all northern forms were at that time confused under the name *lunarioides*, Milde evidently either quoted from some published list or may have received specimens and quoted the current labels; if the latter more the pity. There is nothing more certain than that Milde did not at all understand the very unique character of the exclusively southern plant, and Mr. Davenport's statement, "I cannot believe it possible for him to have been mistaken in any specimens coming under his observation," reminds one more of sentimental hero worship than of a sincere attempt to know the truth. The citation of "authority" and "the opinion of the fathers" is as obsolete in botany as it is elsewhere. It does not surprise me that Mr. Davenport has sought in vain to find anything approaching *lunarioides* in Professor Macoun's collections. The collections of the past sixty years in northern areas has failed to bring it to light, and it is not likely that it exists.

Mr. Davenport's paper well illustrates the dilemma he is in in attempting to refer accurately to any one *thing* in his various references to *Botrychium ternatum*. At one time he is talking of one thing, and in a later sentence of another entirely different. This aggregate consists of several very distinct things, *i. e.*, distinct species, and to continue to refer to the aggregate as *one* is both confusing and unscientific.

In Mr. Davenport's zeal to reduce the species to varietal rank he seemed to overlook my statement that "the true *Botrychium ternatum* is comparatively common in central Alabama and produces its spores late in the season (August to October), the same as it does farther north[4]," and his effort to extend the season of the two species so that their extremes will not seem so widely separate must excite a smile among persons thoroughly familiar with the plants in the field. So far as I can see, the only point that Mr. Davenport has established is that the bud of some specimens of *Botrychium biternatum* is somewhat hairy (if, indeed, he is sure of his specimens, some of which I regard as very doubtfully true *biternatum*), and I fully agree with him in regarding the bud character in the genus, which he has formerly made so much of, as a somewhat unreliable one. I still regard the form which Lamarck first described as *Osmunda biternata* as distinct a species of Botrychium as exists in the country. I am, however, open to evidence, and request that during the present season observers in all parts of the country note the variations in this interesting group and send me material illustrating all the variations in their respective localities.

[4] Bot. Gaz., 22: 408. N. 1896.

So long as my own field observations on Botrychium were confined to central New York and New England, I regarded all the forms that there appear as running into each other and so discarded the "varieties" as trivial. I had never, indeed, until last season seen in the field the genuine form that Sprengel long ago described as *Botrychium dissectum*, a type that sixteen years of collecting in New England, and a large array of material from all parts of that territory, has not revealed as a New England form. Mr. Davenport's statement that it is a common New England form only reveals the fact that he is confusing with it a very different plant which *is* common in New England and elsewhere, but has little in common with the genuine *dissectum*. Had I experienced the misfortune to have my field work confined to eastern Massachusetts I might even yet be holding Mr. Davenport's ultra conservative notions. As it is, I believe now that while the evidence is not all in, the present indications are that Prantl's arrangement of the American species is far more logical than any other arrangement that has yet appeared, and that we have in America in the *ternatum* group a series of species even more distinct when rightly understood than the species of that other closely allied group that Baker so unceremoniously and illogically places under the aggregate "*Botrychium rutaceum* Swz."[5] I am anticipating the pleasure of soon going over the evidence at Kew and the types at Paris, and shall hope that a still wider range of data will help us to arrive at a better understanding of the genus.

It is unnecessary to discuss further Mr. Davenport's position, for his mind was fully made up in advance, since he wrote me some time ago that "Milde had said the last word on Botrychium, as though any problem of taxonomy could be settled by an appeal to "authority," and before the evidence was all in.—LUCIEN M. UNDERWOOD, *Columbia University*.

COLOR IN PLANTS.

To the Editors of the Botanical Gazette:—In your issue of January 1897 there is a notice of Professor Wittrock's studies on the history and origin of the garden pansy, at the conclusion of which is the following pregnant sentence, viz.: "If the pollinating insects prove to be color-blind, as is claimed now by certain physiologists, the yellow eye, as well as all floral coloration, will need a new explanation."

I venture to point out that such a new explanation is suggested in an article entitled "Organic color," which appeared in *Science*, June 16, 1893, published in New York. If any scientist who feels interested in the subject would consider and criticise that paper a useful discussion might ensue.—F. T. MOTT, *Crescent House, Leicester, England*.

[5] It is worth noting that recent European monographers follow Prantl in separating the European species (*B. rutifolium*) from the *ternatum* muddle in which Milde left it. *Cf.*, *e. g.*, Luerssen in Rabenh. Krypt. Flora 3 : 582–588.